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PCT/IB99/01412

PATENT COOPERATION TREATY

520 Rec'd PCT/PTO 17 APR 2000 N/A

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C. 20231
ETATS-UNIS D'AMERIQUE

2683

in its capacity as elected Office

Date of mailing (day/month/year)

27 March 2000 (27.03.00)

International application No.

PCT/IB99/01412

Applicant's or agent's file reference

92643/PRS

International filing date (day/month/year)

27 July 1999 (27.07.99)

Priority date (day/month/year)

28 July 1998 (28.07.98)

Applicant

USKELA, Sami

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

25 February 2000 (25.02.00)



in a notice effecting later election filed with the International Bureau on:

RECEIVED

FEB 1 1 2002

Technology Center 2600

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740 14 35

Authorized officer

Anman QIU



Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

Slingsby, Philip R.
PAGE WHITE & FARRER
54 Doughty Street
LONDON WC1N 2LS
GRANDE BRETAGNE

RECEIVED

19 OCT 2000

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing (day/month/year)	17.10.2000
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Applicant's or agent's file reference 92643/PRS	IMPORTANT NOTIFICATION
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International application No. PCT/IB99/01412	International filing date (day/month/year) 27/07/1999	Priority date (day/month/year) 28/07/1998
---	--	--

Applicant

NOKIA TELECOMMUNICATIONS OY et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
---------------------------------------	--------------------

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465



Cornudet-Henschel, V

Tel. +49 89 2399-7371



PCT

REC'D 19 OCT 2000

WIPO

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 92643/PRS		FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/IB99/01412	International filing date (day/month/year) 27/07/1999	Priority date (day/month/year) 28/07/1998	
International Patent Classification (IPC) or national classification and IPC H04Q7/38			
Applicant NOKIA TELECOMMUNICATIONS OY et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.


2. This REPORT consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 25/02/2000	Date of completion of this report 17.10.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Banerjea, R Telephone No. +49 89 2399 7467



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IB99/01412

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-10 as originally filed

Claims, No.:

1-14 as originally filed

Drawings, sheets:

1/6-6/6 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IB99/01412

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2-14
	No:	Claims	1
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-14
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

A. Citations and explanations in respect of paragraph V:

Reference is made to the following documents:

D1: EP-A-0 695 104

D2: US-A-5 659 598

1. Document **D1** (see in particular col. 1, line 58 to col. 2, line 10; col. 4, lines 1-11; col. 9, lines 8-22; Fig. 1) discloses, according to **all** the features of **claim 1**, a method for performing handover of a mobile station (see "100" in Fig. 1) communicating in a first call via a first network (see "125" in Fig. 1) to communicate in a second call via a second network (see col. 1, line 58 to col. 2, line 2; col. 9, lines 8-11; "275" in Fig. 1), comprising the steps of generating a request for handover, establishing the second call between the first network and the mobile station via the second network (see col. 2, lines 5-9; col. 9, lines 16-20) and transferring data communication between the mobile station and the first network from the first call to the second call (see col. 2, lines 9-10; col. 4, lines 1-11; col. 9, lines 21-22).

The subject-matter of claim 1 therefore is not new, Article 33(2) PCT.

It should furthermore be noted that even if novelty of claim 1 could be argued, based on minor differences between the features of said claim and those disclosed in document D1, the subject-matter of claim 1 would not involve an inventive step, Article 33(3) PCT, having regard to the disclosure of document D1 and the normal knowledge of a person skilled in the art of handover for mobile stations.

2. Furthermore, dependent **claims 2 to 14** do not appear to contain any additional features which in combination with the features of any claim to which they refer, involve an inventive step for the reason that the subject-matter of said claims is either in principle directly derivable from the disclosure of document **D1** (for **claim 2**: see col. 4, lines 37-39; for **claim 3**: see col. 3, lines 13-19; col. 3, lines 50-52; col. 7, lines 13-15; "1040" in Fig. 2; for **claim 5**: see col. 4, lines 1-11; for **claim 9**: see col. 2, lines 45-55; col. 6, lines 27-31; for **claims 11 and 12**: see col. 1, lines

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IB99/01412

33-37; col. 6, lines 22-23; for **claim 13**: see col. 1, lines 38-57) or from a similar application disclosed in **D2** (for **claims 4 and 5**: see col. 4, line 66 to col. 5, line 2; col. 6, lines 1-7; col. 6, lines 46-52; for **claim 6**: see col. 2, lines 29-44; col. 6, lines 59-63; for **claim 8**: see col. 6, lines 14-17; for **claims 11 and 12**: see col. 4, lines 9-16), or represents simple design details which are generally known to a person skilled in the field of handover for mobile stations.

Thus, dependent claims 2 to 14 do not meet the requirements of Article 33(3) PCT.

B. Remarks made in respect of paragraph VII:

1. Claim 1 should have been drafted in the proper two-part form recommended by Rule 6.3.(b),(i),(ii) PCT, having a preamble that correctly reflects the nearest prior art, being represented by the above noted document D1.
2. **Claim 14** contains a reference to the description or drawings "figures 3 to 7". According to Rule 6.2.(a) PCT such a claim is allowable only where the reference is absolutely necessary. Such is, however, not the case here. Claim 14 should thus have been deleted.
3. The claims do not include reference signs in parentheses where features shown in the drawings are referred to, Rule 6.2.(b) PCT.
4. In order to meet the requirements of Rule 5.1.(a),(ii) PCT, the relevant prior art, i.e. the documents D1 and D2 noted above, should have been acknowledged by reference and briefly discussed in the introductory part of the description.
5. The opening part of the description should have been modified to bring it into agreement with any new independent claim, Rule 5.1.(a),(iii) PCT.
6. Following syntax error should have been corrected in the description:
- page 3, lines 2-3: "... to communication ..." should have been amended in "... to communicate ...".

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IB99/01412

7. According to the requirements of Rule 11.13 l) and m) PCT the same feature shall be denoted by the same reference sign throughout the application. This requirement is not met in view of the use of "44" on page 4, line 25 and "46" in Fig. 3 referring to the "MSC".
8. The reference sign "41" used in **Fig. 3** and in the **description** (see page 4, line 23) to indicate the "cell" has been used in parallel in the **description** (see page 4, line 24) for indicating a different feature, i.e. the "Base-station", so that, by this double use of reference signs, an unclarity arises. A corresponding amendment therefore is necessary.

C. Remarks made in respect of paragraph VIII:

Following amendments would have been necessary to the claims, Article 6 PCT:

- in **claim 14**, line 2: "... to communication ..." should have been replaced by "... to communicate ...".
- in method **claim 1** the formulation "comprising" should have been amended in "comprising the steps of".

PCT COOPERATION TREATY

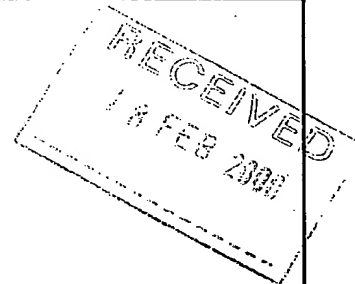
PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:
SLINGSBY, Philip, Roy
Page White & Farrer
54 Doughty Street
London WC1N 2LS
ROYAUME-UNI



Date of mailing (day/month/year) 10 February 2000 (10.02.00)		
Applicant's or agent's file reference 92643/PRS		IMPORTANT NOTICE
International application No. PCT/IB99/01412	International filing date (day/month/year) 27 July 1999 (27.07.99)	Priority date (day/month/year) 28 July 1998 (28.07.98)
Applicant NOKIA NETWORKS OY et al		

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
AU,CN,EP,IL,JP,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CU,CZ,DE,DK,EA,EE,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MN,MW,MX,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,UA,UG,UZ,VN,YU,ZA,ZW
The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).
3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 10 February 2000 (10.02.00) under No. WO 00/07402

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. (41-22) 740.14.35	Authorized officer J. Zahra Telephone No. (41-22) 338.83.38
--	---

The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ EP

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only	
Identification of IPEA	Date of receipt of DEMAND
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION Applicant's or agent's file reference 9 2 6 4 3 / P R S	
International application No. PCT/IB99/01412	International filing date (day/month/year) 27 July 1999 (27.07.99)
(Earliest) Priority date (day/month/year) 28 July 1998 (28.07.98)	
Title of invention INTER-SYSTEM HANDOVER	
Box No. II APPLICANT(S)	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) NOKIA NETWORKS OY Keilalahdentie 4 FIN-02150 Espoo Finland	
Telephone No.: Facsimile No.: Teleprinter No.:	
State (that is, country) of nationality: Finland (FI)	State (that is, country) of residence: Finland (FI)
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.) USKELA; Sami Siltasaarencatu 26 A 1 F-00530 Helsinki Finland	
State (that is, country) of nationality: Finland (FI)	State (that is, country) of residence: Finland (FI)
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)	
State (that is, country) of nationality:	State (that is, country) of residence:
<input type="checkbox"/> Further applicants are indicated on a continuation sheet.	

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCEThe following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*SLINGSBY; Philip Roy
Page White & Farrer
54 Doughty Street
London
WC1N 2LS
United Kingdom

Telephone No.:

0171 831 7929

Facsimile No.:

0171 831 8040

Teleprinter No.:

8955681

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments:***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filedthe description ☒ as originally filed☐ as amended under Article 34the claims ☒ as originally filed☐ as amended under Article 19 (together with any accompanying statement)☐ as amended under Article 34the drawings ☒ as originally filed☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination:English.....

☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.**Box No. V ELECTION OF STATES**The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes not to elect:

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | | |
|--|---|---|--------|
| 1. translation of international application | : | | sheets |
| 2. amendments under Article 34 | : | | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | | sheets |
| 4. copy (or, where required, translation) of statement under Article 19 | : | | sheets |
| 5. letter | : | 1 | sheets |
| 6. other (<i>specify</i>) | : | | sheets |

For International Preliminary Examining Authority use only

received not received

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

- | | |
|--|---|
| 1. <input checked="" type="checkbox"/> fee calculation sheet | 4. <input type="checkbox"/> statement explaining lack of signature |
| 2. <input type="checkbox"/> separate signed power of attorney | 5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form |
| 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: | 6. <input type="checkbox"/> other (<i>specify</i>): |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

HILL; Christopher Michael - Authorised Representative

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply.

☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 92643/PRS	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/IB 99/01412	International filing date (day/month/year) 27/07/1999	(Earliest) Priority Date (day/month/year) 28/07/1998
Applicant NOKIA TELECOMMUNICATIONS OY et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

3



as suggested by the applicant.



None of the figures.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum)

92643/PRS

Box No. I TITLE OF INVENTION
INTER-SYSTEM HANDOVER

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

NOKIA TELECOMMUNICATIONS OY
Keilalahdentie 4
FIN-02150 Espoo
Finland

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:
Finland (FI)

State (that is, country) of residence:
Finland (FI)

This person is applicant for the purposes of:

☐ all designated States

☒ all designated States except the United States of America

☐ the United States of America only

☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

USKELA; Sami
3-25-5 Uehara
Tokyo
Japan

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:
Finland (FI)

State (that is, country) of residence:
Japan (JP)

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☒ the United States of America only

☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

SLINGSBY; Philip Roy
Page White & Farrer
54 Doughty Street
London WC1N 2LS
United Kingdom

Telephone No.

0171 831 7929

Facsimile No.

0171 831 8040

Teleprinter No.

8955681

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
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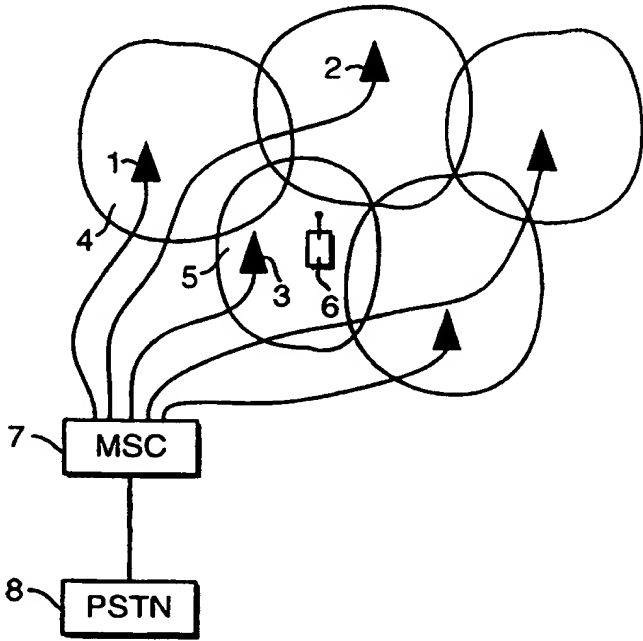
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(54) Title: INTER-SYSTEM HANDOVER (57) Abstract <p>A method for performing handover of a mobile station communicating in a first call via a first network to communication in a second call via a second network, comprising: generating a request for handover; establishing the second call between the first network and the mobile station via the second network; and transferring data communication between the mobile station and the first network from the first call to the second call.</p> 		

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INTER-SYSTEM HANDOVER

This invention relates to a system of handover for mobile stations, for example in a cellular radio telecommunications network.

Figure 1 shows schematically the configuration of a typical cellular radio telecommunications network. The network comprises a number of base-stations (BSs) 1, 2, 3 etc. Each base-station has a radio transceiver capable of transmitting radio signals to and receiving radio signals from the area of a cell 4, 5 etc. next to the base-station. By means of these signals the base-station can communicate with a mobile station (MS) 6 in that cell, which itself includes a radio transceiver. Each base station is connected to a mobile system controller (MSC) 7, which is linked in turn to the public telephone network 8. By means of this system a user of the MS 6 can establish a telephone call to the public network 8 via the BS in whose cell the MS is located.

The location of the MS could be fixed (for example if it is providing radio communications for a fixed building) or the MS could be moveable (for example if it is a hand portable transceiver or "mobile phone"). When the MS is moveable it may move between cells of the cellular radio system. As it moves from one cell (the "old cell") to another cell (the "new cell") there is a need to hand it over from communication with the BS of the old cell to the BS of the new cell without dropping the call due to a break in communications between the mobile station and the network. This process is known as handover. A need can also arise to hand over a MS whose location is fixed, for example if atmospheric conditions affect its communications with the old BS and call quality can be improved by handing it over to another BS or if there is a need to free up capacity of the old BS.

In a conventional cellular radio system handover is controlled automatically by the MSC. Handover can be initiated by the MS or the network dependent, for example, on the quality of the signalling between the MS and the old and new BSs.

When a new cellular network is being introduced it can take some time to install all the base-stations and associated apparatus. Therefore, there is a delay before the new network provides full geographical coverage. Figure 2 illustrates the situation: an existing cellular network provides full geographical coverage by means of cells 20-27 but the new cellular network provides incomplete geographical coverage by means of only cells 28 and 29. This presents a significant commercial problem for the operator of the new network. If the new network is launched for use before its geographical coverage is complete then customers will be dissatisfied by its inferior coverage to the old network. However, the cost of the infrastructure of the new network is high and no return can be gained on it until it is in use.

It has been proposed to tackle this problem by allowing mobile stations using the new network to be handed over to cells of the old network when they move outside the coverage of the new network. For instance, when a mobile station moves from 30 to 31 in figure 2 it could be handed over from the base station of cell 28 (in the new network) to that of cell 21 (in the old network). However, the base-stations of cells 28 and 21 are in different networks and are therefore not linked by a common MSC, so conventional handover processes cannot be used. One solution to this could be to modify the old network to allow it to support inter-network handover. However, modifying the old network would be expensive and inconvenient.

There is therefore a need for a new method for handover between two telecommunications networks.

According to the present invention there is provided a method for performing handover of a mobile station communicating in a first call via a first network to communication in a second call via a second network, comprising: generating a request for handover; establishing the second call between the first network and the mobile station via the second network; and transferring data communication between the mobile station and the first network from the first call to the second call.

The method preferably also comprises the step of releasing the first call after data communication between the mobile station and the first network has been transferred from the first call to the second call. The said data communication is suitably communication of user data such as speech or other communication information.

The request for handover may be generated by the mobile station or the first network. Preferably the one of those entities generating the request transmits a message to the other of those entities to request the handover.

The mobile station may originate the second call. In that case it is preferred that the first network transmits to the mobile station data indicating an identification for the handover operation. Subsequently the mobile station may transmit to the second network data indicating that identification; and when the second call has been established the second network may transmit to the first network data indicating that identification. In response to receiving the identification in this way the first network may initiate transfer of the data communication from the first call to the second call.

The first network may originate the second call. In that case it is preferred that the mobile station transmits its identification in the second network (e.g. its MSISDN in the second network) to the first network and the first network uses that identification in originating the second call.

The geographical coverage of the second network may suitably be greater than that of the first network, at least in the region of the mobile station's location.

The first and second networks may suitably be cellular telephone networks. The mobile station may suitably be capable of communicating by radio with the first and second networks. The first and second calls may both be telephone calls. The mobile station may, for example, be a radio telephone.

The present invention will now be described by way of example with reference to the accompanying drawings, in which:

figure 1 shows schematically the configuration of a typical cellular radio telecommunications network;

figure 2 shows coverage of two overlapping telecommunications networks;

figure 3 illustrates a handover process;

figure 4 illustrates information flow for a mobile station triggered handover with a mobile terminated call;

figure 5 illustrates information flow for a network triggered handover with a mobile terminated call;

figure 6 illustrates information flow for a mobile station triggered handover with a mobile originated call; and

figure 7 illustrates information flow for a network triggered handover with a mobile originated call.

The handover process illustrated in figure 3 allows a mobile station 39 to be handed over between two telecommunications networks. In this illustration the mobile station moves from cell 40 to cell 41. Cell 40 is the cell of base-station 42 in network NW1. Base-station 41 is connected to the public telephone network 43 via an MSC 44 of network NW1. Cell 41 is the cell of base-station 45 in network NW2. Base-station 45 is connected to the public telephone network 43 via an MSC 46 of network NW2.

Initially the MS 39 is in communication with BS 42 and MSC 46 by means of a call 47 using the protocol of network NW1. When the MS moves away from the BS 42 it reaches a zone 48 where cells 40 and 41 overlap and the MS can communicate with both BS 42 and BS 45. Whilst the MS is in that overlap zone 48 it can be handed over from BS 42 to BS 45. The handover can be initiated by the mobile station, for example if it detects a greater signal strength or a lesser error rate for communications with BS 45 than with BS 42. Alternatively the handover can be initiated by the network, for example if it detects that communications between base-station 42 and mobile station 39 have a signal strength that falls below or an error rate that rises above pre-set thresholds, or if it is desired to free up capacity of base station 42 by handing the MS 39 off to BS 45.

The mobile station is capable of maintaining a call with a base-station of network NW1 at the same time as maintaining a call with a base-station of network NW2. Dual band mobile stations of this general type are well-known. Such mobile stations can make the normal location updates to both networks.

Once handover has been initiated, by the mobile station or the network, a second call 49 is established between the mobile station 39 and the MSC 46. This call passes over network NW1 via the base station 45. Meanwhile the original call 47 is maintained. Thus at this stage there are two calls in progress at once from the mobile switching centre of network NW1 to the mobile station 39. Once the second call 49 has been established network NW1 routes the data formerly being carried by the original call 47 over the second call 49. Then the original call 45 can be released. The mobile station 39 then communicates with the mobile switching centre of the network NW1 to which it was originally connected only via a base station of network NW2. Thus the mobile station has in effect been handed off to network NW2, although the call is still routed through the MSC 46 of network NW1. If the call passed onward to the public telephone network 43 from the MSC 46 (rather than to another mobile station in network NW1, for example) then this arrangement could be inefficient. To overcome this there could be

provided means for optimising the routing of the call after handover has taken place, for example by routing the call to the public telephone network directly from the MSC of network NW2 rather than via that of NW1.

Figures 4 to 7 illustrate possible ways of implementing this type of handover.

Figure 4 shows the signalling used for a mobile station triggered handover when mobile terminated calls are used. Initially the mobile station is in communication with network NW1 over call 47. When the MS 39 discovers that inter-system handover is required it sends a handover request 50 to the MSC of network NW1. This handover request includes information that defines the identification number of the mobile station (its MSISDN) in network NW2. Then the MSC of network NW1 makes a new call (call 49) to that MSISDN number. This could be done using ISUP or TUP signalling. A request 51 for this new call reaches network NW2 which sets up the call with the mobile MS 39 in the usual way for a mobile terminated call - for example by means of page and page_response messages 52, 53. The new call 49 is then set up (at 54). When the new call 49 has been set up network NW2 returns the normal message (e.g. ISUP_connect message 55) to indicate this fact to the network NW1 that originated the call 49. The network NW1 can then issue a message (indicated as a handover_confirmation message 56) to the mobile station to confirm that handover can now be made. Then the mobile station and the network NW1 connect call 47 to call 49 (at 57) so that user data that would formerly have been carried over call 47 is carried instead over call 49. Once all user data is being carried over call 49 then call 47 can be released (at 58). Handover is then complete.

Figure 5 shows the signalling used for a network triggered handover when mobile terminated calls are used. Initially the mobile station is in communication with network NW1 over call 47. When the network NW1 discovers that inter-system handover is required it sends a handover request 60 to the mobile station 39. In response to this handover request the mobile station 39 returns an

acknowledgement signal (indicated as `handover_request_acknowledgement` signal 61) that includes information that defines the identification number of the mobile station (its MSISDN) in network NW2. Then the handover proceeds as described above in the scenario of figure 4 following receipt by network NW1 of the handover request 50. The MSC of network NW1 makes a new call (call 49) to that MSISDN number. This could be done using ISUP or TUP signalling. A request 62 for this new call reaches network NW2, which sets up the call with the mobile MS 39 in the usual way for a mobile terminated call - for example by means of page and page_response messages 63, 64. The new call 49 is then set up (at 65). When the new call 49 has been set up network NW2 returns the normal message (e.g. ISUP_connect message 66) to indicate this fact to the network NW1 that originated the call 49. The network NW1 can then issue a message (indicated as a `handover_confirmation` message 67) to the mobile station to confirm that handover can now be made. Then the mobile station and the network NW1 connect call 47 to call 49 (at 68) so that user data that would formerly have been carried over call 47 is carried instead over call 49. Once all user data is being carried over call 49 then call 47 can be released (at 69). Handover is then complete.

Figure 6 shows the signalling used for a mobile station triggered handover when mobile originated calls are used. Initially the mobile station 39 is in communication with network NW1 over call 47. When the MS 39 discovers that inter-system handover is required it sends a handover request 70 to the MSC of network NW1. The network NW1 replies with a handover request acknowledgement message 71 to the mobile station. This handover request acknowledgement message includes information that defines a handover number assigned by the network NW1 to this handover operation. The mobile station 39 then makes a new call (call 49) to the network NW2, for example by means of a CC_setup message 72. In connection with that call the mobile station reports to the network NW2 the handover number that it has been given. This could be done by means of the CC_setup message itself. The new call 49 is then set up

(at 73). When the new call 49 has been set up network NW2 returns a message (e.g. ISUP_connect message 74) to indicate this fact to the network NW1 that originated the new call 49. As part of this message or otherwise the network NW2 also reports to the network NW1 the handover number associated with the new call. On receiving this handover number from the network NW2 the network NW1 knows that the handover can be completed by means of the new call 49. The network NW1 can then issue a handover confirmation message 75 to the mobile station to confirm that handover can now be made. Then the mobile station and the network NW1 connect call 47 to call 49 (at 76) so that user data that would formerly have been carried over call 47 is carried instead over call 49. Once all user data is being carried over call 49 then call 47 can be released (at 77). Handover is then complete.

Figure 7 shows the signalling used for a network triggered handover when mobile originated calls are used. Initially the mobile station 39 is in communication with network NW1 over call 47. When the network NW1 discovers that inter-system handover is required it sends a handover request 80 to the mobile station 39. This handover request includes information that defines a handover number assigned by the network NW1 to this handover operation. The mobile station 39 then replies with a handover request acknowledgement message 81 to the network NW1 and makes a new call (call 49) to the network NW2, for example by means of a CC_setup message 82. In connection with that call the mobile station reports to the network NW2 the handover number that it has been given. This could be done by means of the CC_setup message itself. The new call 49 is then set up (at 83). When the new call 49 has been set up network NW2 returns a message (e.g. ISUP_connect message 84) to indicate this fact to the network NW1 that originated the new call 49. As part of this message or otherwise the network NW2 also reports to the network NW1 the handover number associated with the new call. On receiving this handover number from the network NW2 the network NW1 knows that the handover can be completed by means of the new call 49. The network NW1 can then issue a handover confirmation message 85 to

the mobile station to confirm that handover can now be made. Then the mobile station and the network NW1 connect call 47 to call 49 (at 86) so that user data that would formerly have been carried over call 47 is carried instead over call 49. Once all user data is being carried over call 49 then call 47 can be released (at 87). Handover is then complete.

One situation where this handover process could usefully be implemented is when a mobile station is being handed over from a network with incomplete geographical coverage to one with greater geographical coverage. For example, the network NW1 from which the mobile station is being handed over could be a localised network or a network in the course of construction; the network NW2 to which the mobile station is being handed over could be a more extensive or more established network. The networks could be of different core network types. One specific example is where one of the networks (e.g. network NW1) is a 2G network such as a PDC network and the other network (e.g. network NW2) is a 3G network such as an IMT-2000 network.

In the case of both mobile terminated calls (figures 4 and 5) and mobile originated calls (figures 6 and 7) there is no need for any change from conventional signalling in the network to which the mobile station is being handed over. This makes the handover method very convenient to implement since there is no need to modify the existing network. Thus only one of the networks needs specifically to support the handover method. In the case of mobile originated calls (figures 6 and 7), since the handover number could be an E.164 or E.163 number, to which the mobile station is calling, conventional signalling in network NW2 can support the return of that number to the network NW1.

When the network NW2 has a greater coverage than network NW1 it is likely that the need to hand over from network NW1 to network NW2 will be more common than the need to hand over from network NW2. Thus any inability to handover easily from network NW2 to network NW1 (i.e. in the opposite direction from that

described in detail above), for example because such handover is not supported by network NW2, may not be significant.

The present invention may include any feature or combination of features disclosed herein either implicitly or explicitly or any generalisation thereof, irrespective of whether it relates to the presently claimed invention. In view of the foregoing description it will be evident to a person skilled in the art that various modifications may be made within the scope of the invention.

CLAIMS

1. A method for performing handover of a mobile station communicating in a first call via a first network to communication in a second call via a second network, comprising:

- generating a request for handover;
- establishing the second call between the first network and the mobile station via the second network; and
- transferring data communication between the mobile station and the first network from the first call to the second call.

2. A method as claimed in claim 1, comprising the step of releasing the first call after data communication between the mobile station and the first network has been transferred from the first call to the second call.

3. A method as claimed in claim 1 or 2, wherein the mobile station generates the request for handover.

4. A method as claimed in claim 1 or 2, wherein the first network generates the request for handover.

5. A method as claimed in any preceding claim, wherein the mobile station originates the second call.

6. A method as claimed in claim 5, wherein:

- the first network transmits to the mobile station data indicating an identification for the handover operation;
- the mobile station transmits to the second network data indicating that identification; and
- when the second call has been established the second network transmits to the first network data indicating that identification.

7. A method as claimed in any of claims 1 to 4, wherein the first network originates the second call.
8. A method as claimed in claim 7, wherein the mobile station transmits its identification in the second network to the first network and the first network uses that identification in originating the second call.
9. A method as claimed in any preceding claim, wherein the geographical coverage of the second network is greater than that of the first network.
10. A method as claimed in any preceding claim, wherein the first network is an IMT-2000 network.
11. A method as claimed in any preceding claim, wherein the second network is a PDC network.
12. A method as claimed in any preceding claim wherein the first and second networks are cellular telephone networks.
13. A method as claimed in any preceding claim, wherein the mobile station is capable of communicating by radio with the first and second networks.
14. A method for performing handover substantially as herein described with reference to figures 3 to 7 of the accompanying drawings.

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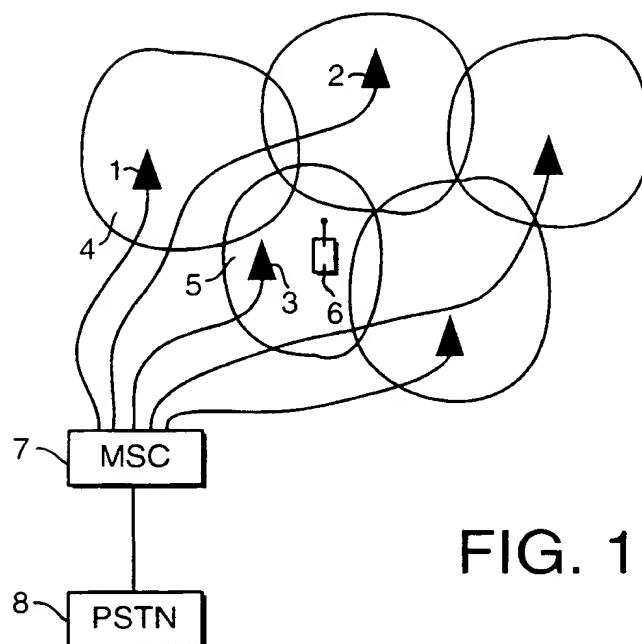


FIG. 1

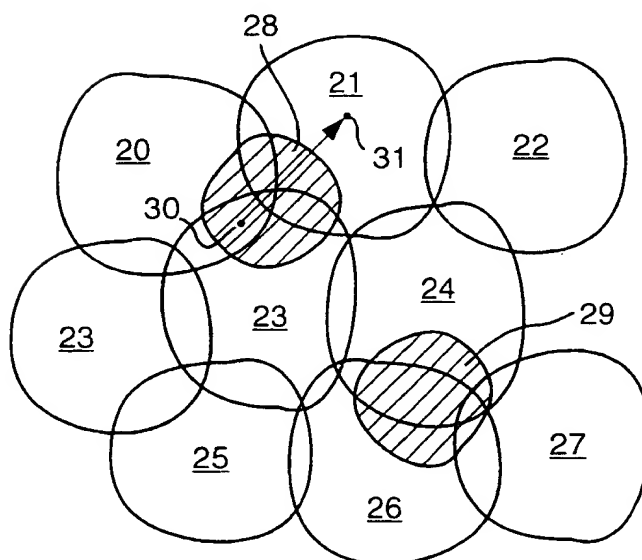


FIG. 2

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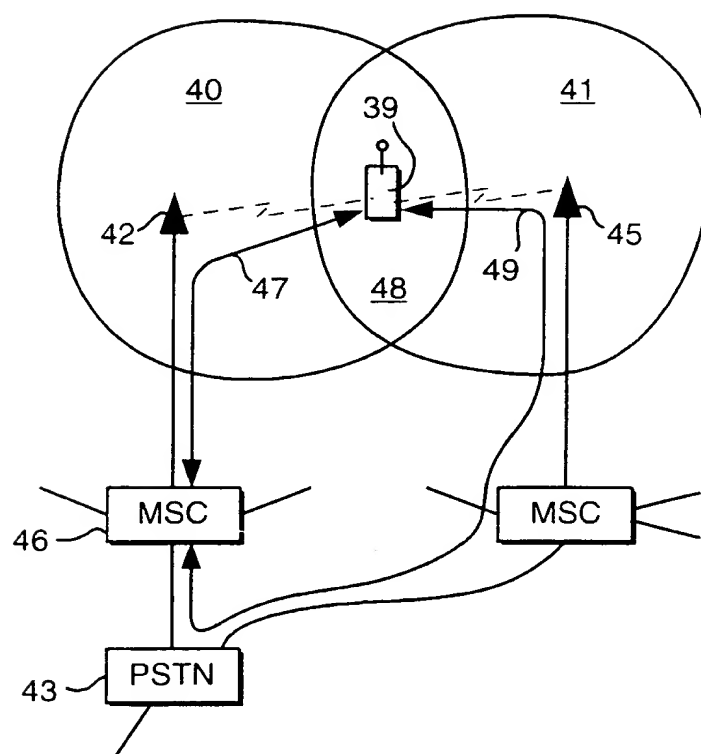


FIG. 3

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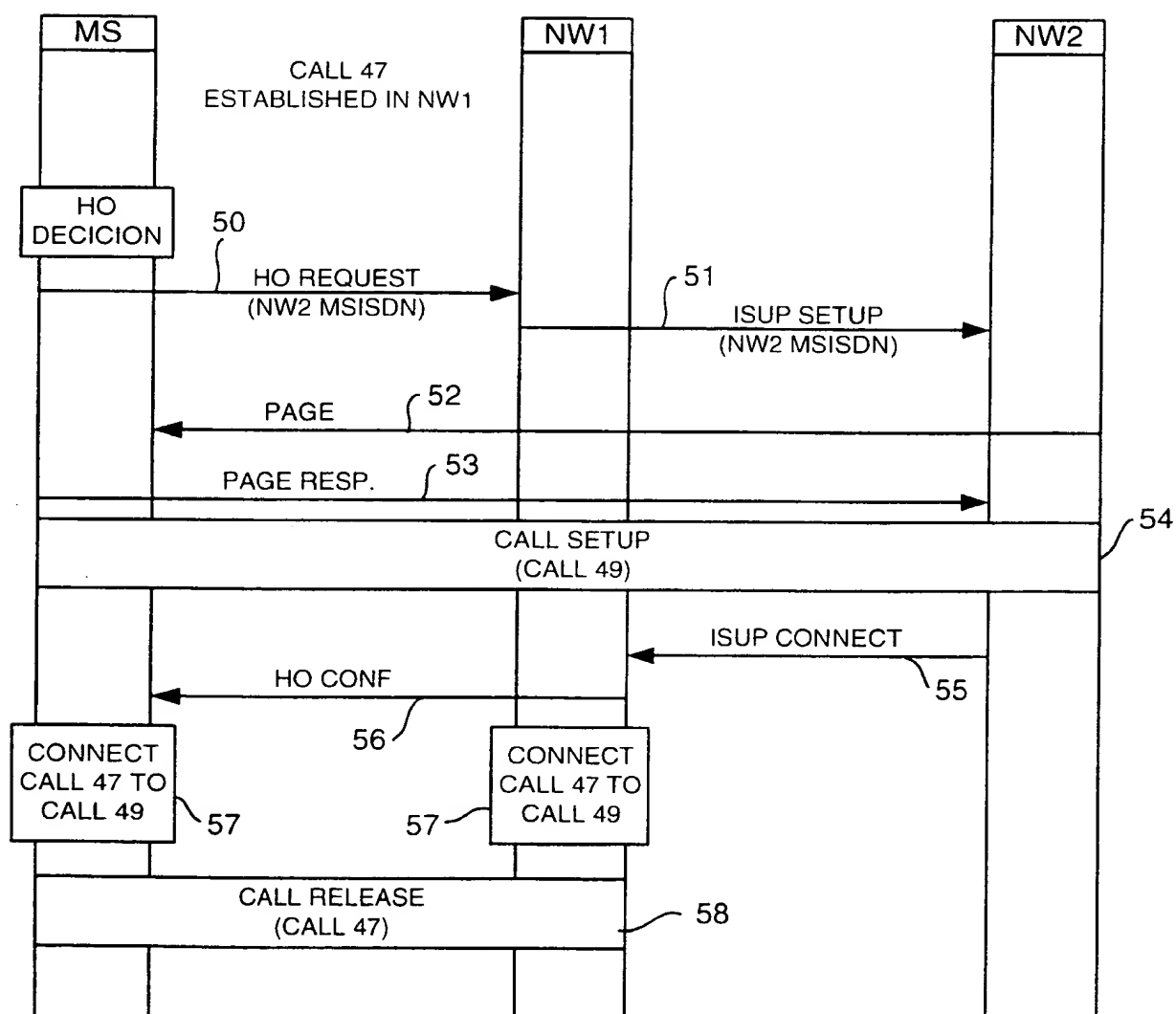


FIG. 4

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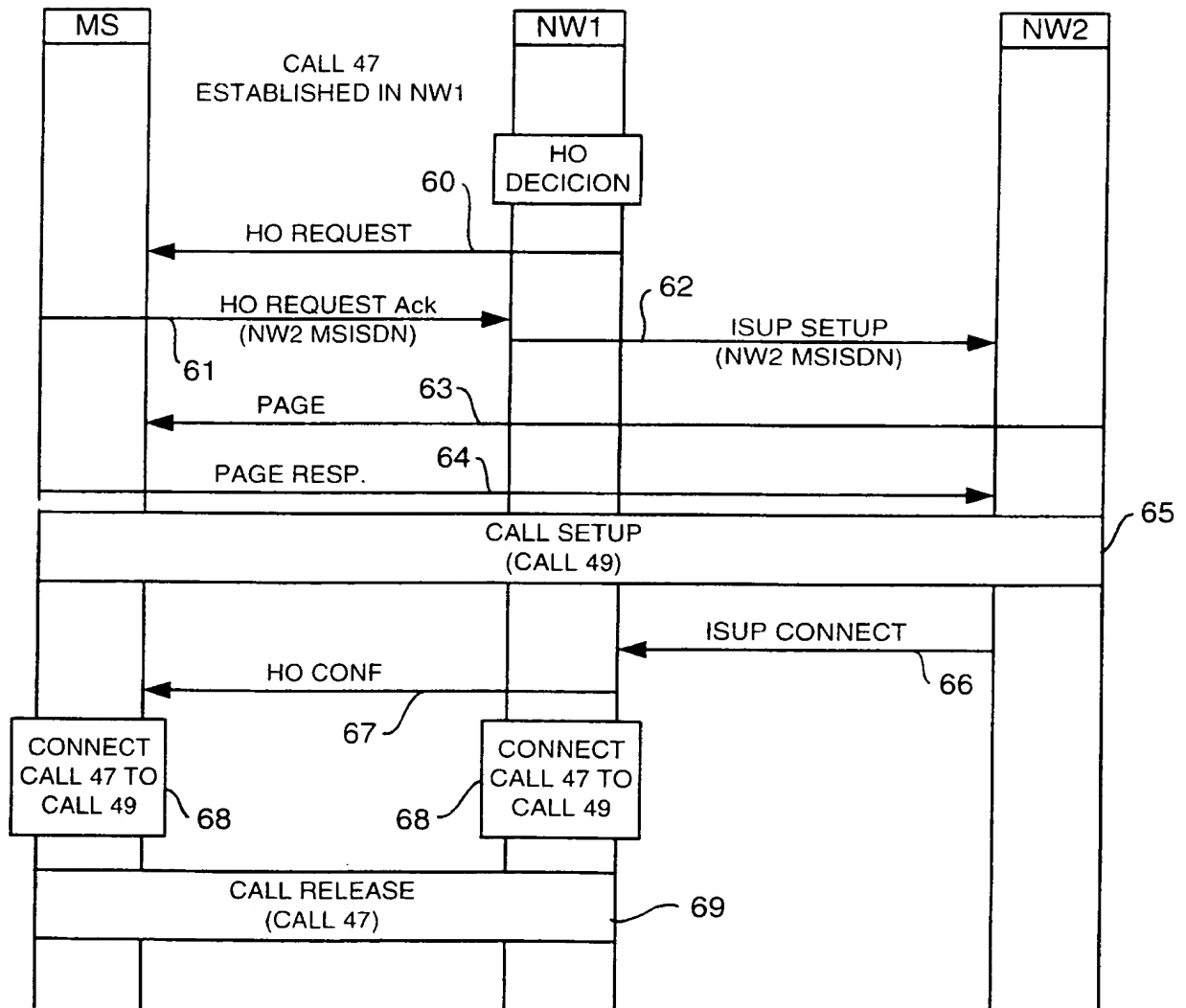


FIG. 5

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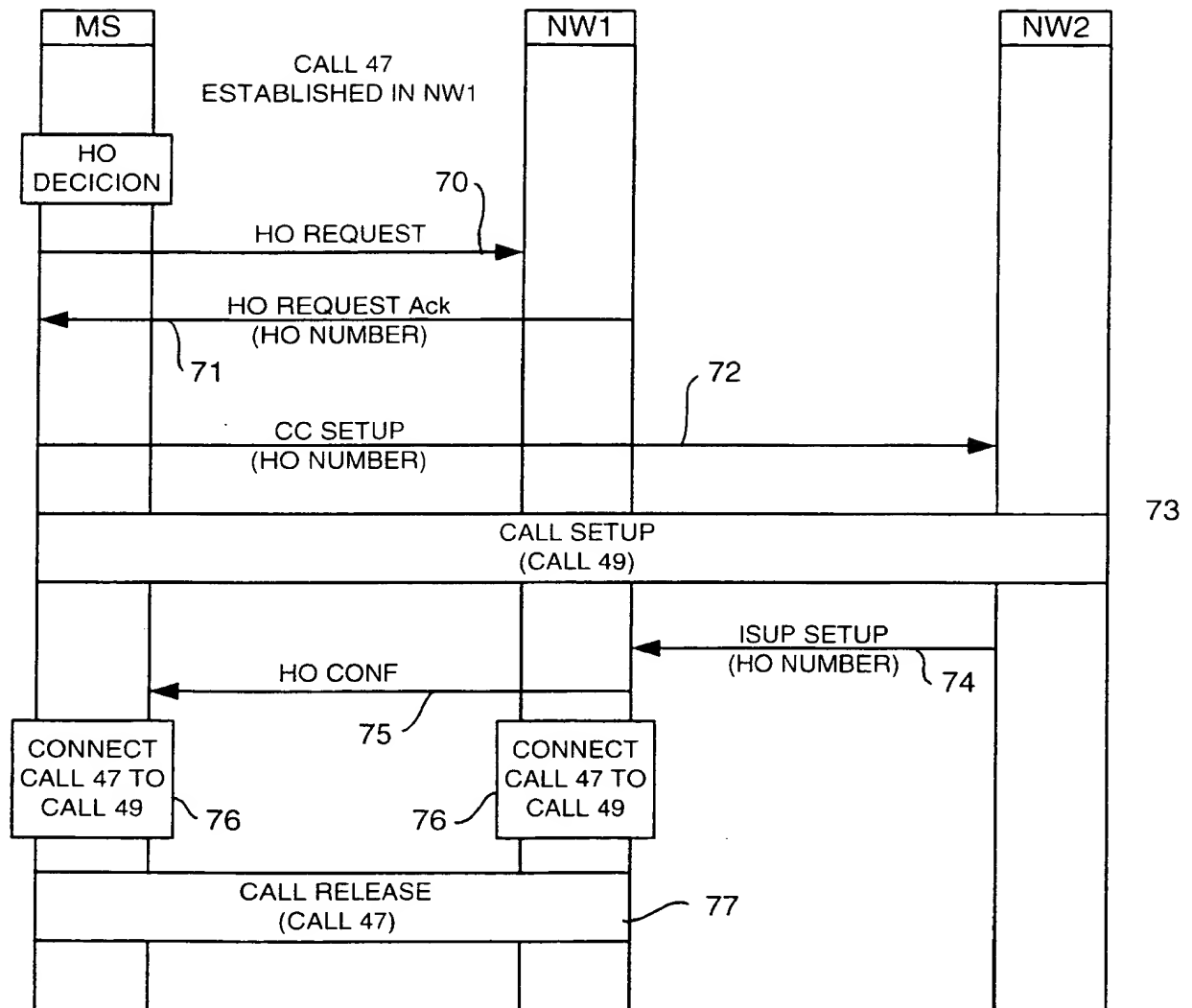


FIG. 6

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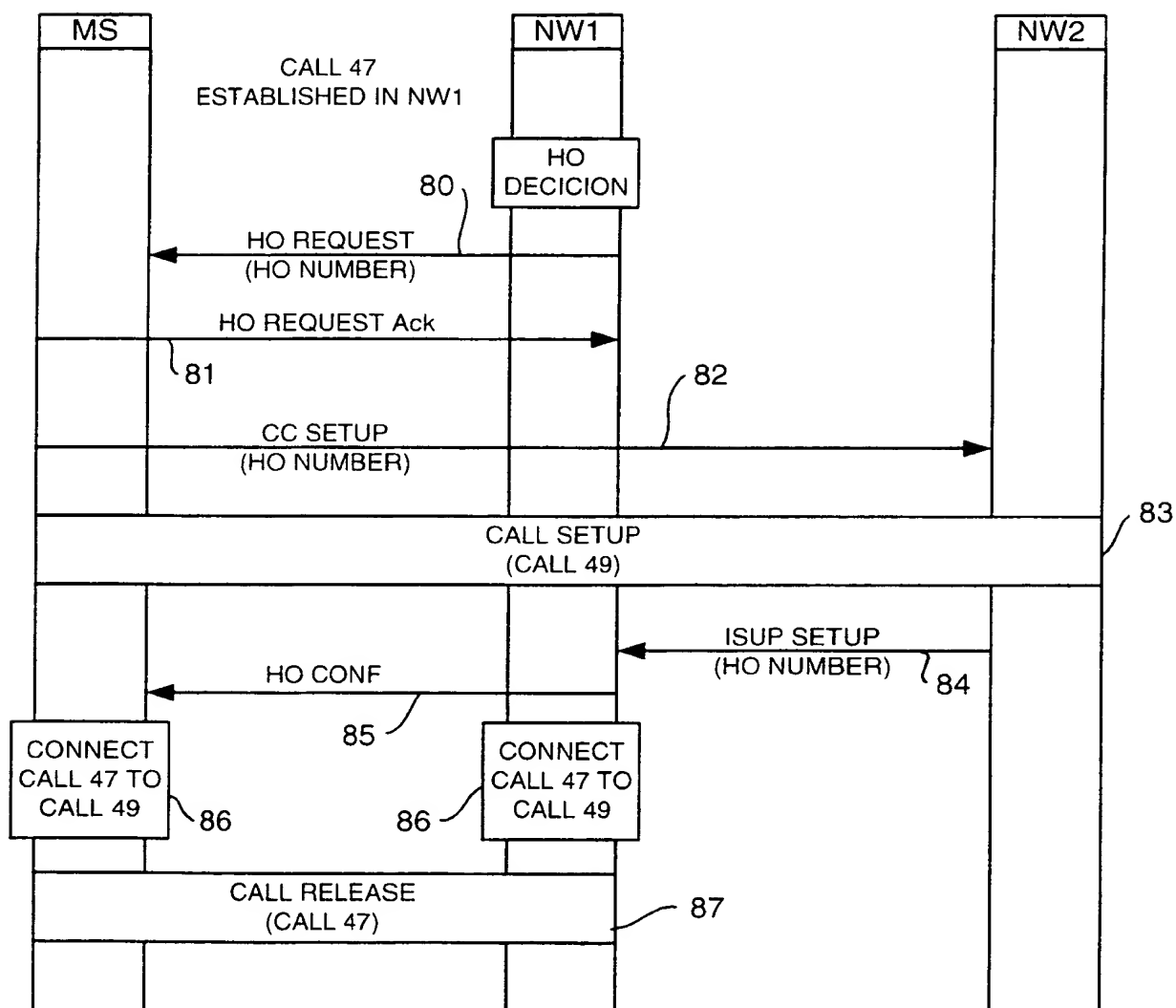


FIG. 7

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 99/01412

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H04Q7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 659 598 A (JAERVELAE TEUVO ET AL) 19 August 1997 (1997-08-19) column 4, line 9 -column 6, line 16 ---	1-3,5, 7-14
X	EP 0 695 104 A (SIEMENS ROLM COMM INC) 31 January 1996 (1996-01-31) the whole document ---	1-3,5, 9-14
X	EP 0 700 167 A (AT & T CORP) 6 March 1996 (1996-03-06) column 10, line 1 -column 11, line 47 -----	1,2,4, 7-14



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 99/01412

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